PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-284729
(43)Date of publication of application : 07.10.1994

(51)Int.Cl. H02M 7/06

(21)Application number : 05-069805
(22)Date of filing : 29.03.1993

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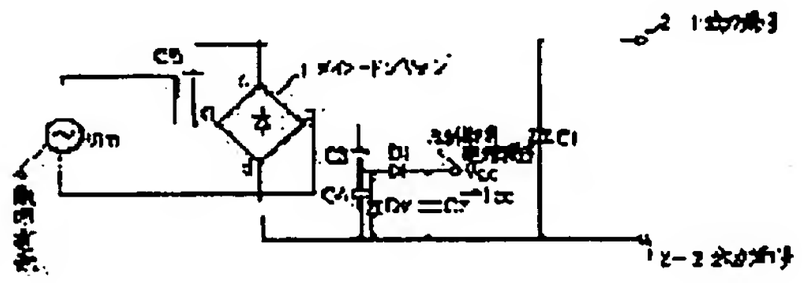
(54) POWER-SUPPLY CIRCUIT

(57)Abstract:
PURPOSE: To prevent the output voltage of a main DC power supply from becoming higher than a prescribed value even when a current flowing on the side of a load is small and to reduce the loss of electric power used to produce a DC power supply for control.
CONSTITUTION: A diode bridge 1 full-wave-rectifies an AC current which is input from a commercial power supply 4, and the AC current is converted into a main DC current. On the other hand, a half-wave rectified voltage in the diode bridge 1 is divided by capacitors C3, C4, divided voltages are rectified by diodes D1, D2, they are smoothed by a capacitor C2, and a DC power supply for control is produced. When a current in a load becomes small, a voltage which has been charged in the capacitors C3, C4 is added to a smoothing capacitor C1, and a voltage which has been charged in a capacitor C5 is added to the capacitor C1. However, since the polarity of the charged voltage in the capacitors C3, C4 is opposite to that of the charged voltage in the capacitor, the terminal voltage of the capacitor C1 maintains a prescribed voltage after all.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]
[Claim 1] After carrying out full wave rectification of the AC power supply in a diode bridge, while carrying out smooth [of this] by the capacitor for smooth and obtaining the main DC power supply In the power circuit which pressures partially the half-wave rectification electrical potential difference outputted from said diode bridge by two or more capacitors for partial pressures by which the series connection was carried out, and makes the power source for control from this partial pressure electrical potential difference The power circuit characterized by providing the capacitor charged on the half-wave rectification electrical potential difference of reversed polarity with the half-wave rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from said diode bridge.
[Claim 2] The power circuit according to claim 1 characterized by making equal to the series connection capacity of two or more of said capacitors for partial pressures capacity of the capacitor charged on the half-wave rectification electrical potential difference of reversed polarity with the half-wave rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from said diode bridge.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the configuration for starting the power circuit which changes AC power supply into DC power supply, especially obtaining the DC power supply for control apart from the main DC power supply.
[0002]
[Description of the Prior Art] This kind of power circuit has the configuration as shown in drawing 2 conventionally. After full wave rectification of the alternating current inputted from a source power supply 4 was carried out by the diode bridge 1 and smooth is carried out by the capacitor C1 for smooth, it is outputted to the output terminal 2-1 and load side which is not illustrated from 2-2 (for example, inverter etc.). On the other hand, the DC power supply for control are taken out from the output terminal 3 for control connected at the node of resistance R1 and the capacitor C2 for smooth, and are supplied to the circuit for control which is not illustrated. That is, the voltage drop of the main DC-power-supply electrical potential difference outputted from a diode bridge 1 was carried out by resistance R1, and these DC power supply for control have obtained it. If input voltage is set to Vin, the current outputted from the terminal 3 for control is set to Icc and output voltage of the power supply terminal 3 for control is set to Vcc here, in order to make the DC power supply for control by the voltage drop of resistance R1 as mentioned above, effective power consumption is a [formula].
$\sqrt{2} \times Vin \times Icc$

There was a fault that became and the power loss for creating the DC power supply for control became large.
[0003] Then, in order to avoid the above-mentioned fault, the power circuit as shown in drawing 3 is developed. In this circuit, the series circuit which consists of capacitors C3 and C4 between the minus side output terminal of a diode bridge 1 and an alternating current input terminal is connected. After full wave rectification of the partial pressure electrical potential difference obtained from the node of these capacitors C3 and C4 is carried out by diodes D1 and D2, by the capacitor C2 for smooth, smooth [of it] is carried out and it becomes the DC power supply for control. In this circuit, since the half-wave rectification electrical potential difference outputted from a diode bridge 1 was pressured partially by capacitors C3 and C4 and the DC power supply for control have been obtained, effective power consumption serves as abbreviation VccxIcc, and can make a part for a power loss quite smaller than the circuit shown in drawing 2 . However, since the in one direction flowed electrical potential difference charged by capacitors C3 and C4 is added to the charge electrical potential difference of the capacitor C1 for smooth when the current which flows to the output terminal 2-1 and load side connected to 2-2 is small, There was a fault that a terminal 2-1 and the electrical potential difference outputted from 2-2 will become high, and there was un-arranging [of having a bad influence on the component by the side of a load depending on the case].
[0004]
[Problem(s) to be Solved by the Invention] While changing alternating current into a direct current as mentioned above and making the main DC power supply, in order to make small the power loss for making the DC power supply for control, the above-mentioned DC power supply for control are made in the conventional power circuit which makes the DC power supply for control with an electrical potential difference lower than said main DC power supply by pressuring partially the half-wave rectification electrical potential difference outputted from the diode bridge which changes said alternating current into a direct current by the capacitor. However, there was a fault of it being added to the main DC-power-supply electrical potential difference to which the charge electrical potential difference of said partial pressure capacitor is outputted, and the output voltage concerning said load having become high, and having a bad influence on the component by the side of a load etc. by this circuit when the current which the load of the main DC power supply has, and flows to a load side is small. [light]

[0005] Then, this invention removes the above-mentioned fault, and even if the current which flows to a load side is small, it aims at the power loss for the output voltage of the main DC power supply not becoming higher than a predetermined value, and making the DC power supply for control offering a small power circuit.
[0006]
[Means for Solving the Problem] This invention pressures partially the half-wave-rectification electrical potential difference outputted from said diode bridge while carrying out smooth [of this] by the capacitor for smooth and obtaining the main DC power supply, after carrying out full wave rectification of the AC power supply in a diode bridge by two or more capacitors for partial pressures by which the series connection was carried out, and has a configuration possessing the capacitor charged on the half-wave-rectification electrical potential difference of reversed polarity with the half-wave-rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from said diode bridge in the power circuit which makes the DC power supply for control from this partial pressure electrical potential difference.
[0007]
[Function] Although the electrical potential difference charged by the series circuit of the capacitor for partial pressures for making the DC power supply for control is added to the capacitor for smooth of an output side in the power circuit of this invention when the load current of the main DC power supply becomes small Since said charge electrical potential difference of the capacitor charged on the half-wave rectification electrical potential difference of reversed polarity with the half-wave rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from a diode bridge is added to the capacitor for smooth of said output side at coincidence, Said both charge electrical potential difference is canceled on said capacitor for smooth, and since the main DC-power-supply electrical potential difference outputted to said load side is pressured partially by the capacitor and makes control voltage while it can always maintain a predetermined electrical potential difference, it can make a power loss small.
[0008]
[Example] Hereafter, one example of this invention is explained with reference to a drawing. Drawing 1 is the circuit diagram having shown one example of the power circuit of this invention. The diode bridge which 1 carries out full wave rectification of the alternating current, and is changed into a direct current, The power supply terminal for control with which, as for 2-1 and 2-2, the output terminal of the main DC power supply is outputted, and, as for 3, the DC power supply for control are outputted, The source power supply to which 4 supplies AC power supply, and C1 The capacitor for smooth of the main DC power supply, The capacitor for partial pressures for C2 to make C3 and for the capacitor for smooth of the DC power supply for control and C4 make the DC power supply for control, The capacitor for cancellation for C5 to cancel the charge electrical potential difference of the capacitor for partial pressures on the capacitor C1 for smooth, and D1 and D2 are the diodes for rectification for obtaining the DC power supply for control.
[0009] Next, actuation of this example is explained. The alternating current supplied from a source power supply 4 is inputted into the input sides a and b of a diode bridge 1. A diode bridge 1 carries out full wave rectification of the inputted alternating current, changes it into a direct current, and outputs this to an output terminal 2-1 and 2-2 through a smoothing capacitor C1 from output sides c and d. Thus, after smooth [of the main DC power supply outputted from diode BURIIJI 1] is carried out by the smoothing capacitor C1, they are supplied to the output terminal 2-1 and load side which is not illustrated from 2-2. In addition, the output side d is [the output side c of a diode bridge 1] on - side by + side.
[0010] After a partial pressure is carried out by capacitors C3 and C4 and the partial pressure electrical potential difference is rectified by diodes D1 and D2, smooth [of the half-wave rectification electrical potential difference generated between the input side edge child b of a diode bridge 1 and the output side terminal d] is further carried out by the capacitor C2, and it becomes the DC power supply for control. These DC power supply for control are supplied to the control circuit of the load described above from the power supply terminal 3 for control, for example etc. Here, the capacity of the capacitor C5 connected between the input terminal a of a diode bridge 1 and the output terminal c by the side of + and the above-mentioned capacitors C3 and C4 for partial pressures is set up as there is relation which is described below. By 1/C5=1 / C 3+1 / C4, after all, C5=C3C4/(C3+C4), i.e., the capacity of a capacitor C5, is set up so that it may become equal to the capacity when carrying out series connection of the capacitors C3 and C4. And the series circuit of capacitors C3 and C4 is connected between the input terminal b of a diode bridge 1, and the output terminal d by the side of -, since the capacitor C5 is connected between the input terminal a of a diode bridge 1, and the output terminal c by the side of +, the polarity of a part for a part for the direct current voltage charged by capacitors C3 and C4 and the direct current voltage charged by the capacitor C5 is opposite, and it becomes tales doses.
[0011] By the way, although a part for the direct current voltage by which this example was also charged by the capacitors C3 and C4 for partial pressures will be added to the electrical potential difference charged by the

capacitor C1 if the current of an output terminal 2-1 and the main DC power supply supplied to a load side from 2-2 becomes small, at this time, the electrical potential difference charged by the capacitor C5 will also be added to the charge electrical potential difference of the capacitor C1 for smooth. However, on this electrical potential difference, since the polarity is opposite, the charge charged by the series circuit of capacitors C3 and C4 as described above, and the charge of each other on the capacitor C1 for smooth charged by the capacitor C5 are canceled after all, and the terminal voltage of a capacitor C1 is maintained by the predetermined main DC-power-supply electrical potential difference.

[0012] According to this example, since the DC power supply for control are pressuring partially and creating the half-wave rectification electrical potential difference outputted from a diode bridge 1 by capacitors C3 and C4, they can lessen the power loss for creating the DC power supply for control. Moreover, although the electrical potential difference charged by the series circuit of said capacitors C3 and C4 is added to the charge electrical potential difference of the capacitor C1 for smooth when the load current of the main DC power supply becomes small Since said charge electrical potential difference of the capacitor C5 by which the electrical potential difference of reversed polarity was charged with the charge electrical potential difference of said capacitors C3 and C4 is added to the capacitor C1 for smooth at coincidence, Even if said load current becomes small, it is prevented that the terminal voltage of the capacitor C1 for smooth becomes high, and he is trying for there to be no bad influence to the component by the side of a load.

[0013]

[Effect of the Invention] The power loss for being able to prevent that the output voltage of the main DC power supply becomes higher than a predetermined value even if the current which flows to a load side is small according to the power circuit of this invention, as described above, and making the DC power supply for control can be made small.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application] This invention relates to the configuration for starting the power circuit which changes AC power supply into DC power supply, especially obtaining the DC power supply for control apart from the main DC power supply.

[Translation done.]

PRIOR ART

[Description of the Prior Art] This kind of power circuit has the configuration as shown in drawing 2 conventionally. After full wave rectification of the alternating current inputted from a source power supply 4 was carried out by the diode bridge 1 and smooth is carried out by the capacitor C1 for smooth, it is outputted to the output terminal 2-1 and load side which is not illustrated from 2-2 (for example, inverter etc.). On the other hand, the DC power supply for control are taken out from the output terminal 3 for control connected at the node of resistance R1 and the capacitor C2 for smooth, and are supplied to the circuit for control which is not illustrated. That is, the voltage drop of the main DC-power-supply electrical potential difference outputted from a diode bridge 1 was carried out by resistance R1, and these DC power supply for control have obtained it. If input voltage is set to Vin, the current outputted from the terminal 3 for control is set to Icc and output voltage of the power supply terminal 3 for control is set to Vcc here, in order to make the DC power supply for control by the voltage drop of resistance R1 as mentioned above, effective power consumption is a [formula].

$$\sqrt{2} \times V\,i\,n \times I\,c\,c$$

There was a fault that became and the power loss for creating the DC power supply for control became large.

[0003] Then, in order to avoid the above-mentioned fault, the power circuit as shown in drawing 3 is developed. In this circuit, the series circuit which consists of capacitors C3 and C4 between the minus side output terminal of a diode bridge 1 and an alternating current input terminal is connected. After full wave rectification of the partial pressure electrical potential difference obtained from the node of these capacitors C3 and C4 is carried out by diodes D1 and D2, by the capacitor C2 for smooth, smooth [of it] is carried out and it becomes the DC power supply for control. In this circuit, since the half-wave rectification electrical potential difference outputted from a diode bridge 1 was pressured partially by capacitors C3 and C4 and the DC power supply for control have been obtained, effective power consumption serves as abbreviation VccxIcc, and can make a part for a power loss quite smaller than the circuit shown in drawing 2 . However, since the in one direction flowed electrical potential difference charged by capacitors C3 and C4 is added to the charge electrical potential difference of the capacitor C1 for smooth when the current which flows to the output terminal 2-1 and load side connected to 2-2 is small, There was a fault that a terminal 2-1 and the electrical potential difference outputted from 2-2 will become high, and there was un-arranging [of having a bad influence on the component by the side of a load depending on the case].

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EFFECT OF THE INVENTION

[Effect of the Invention] The power loss for being able to prevent that the output voltage of the main DC power supply becomes higher than a predetermined value even if the current which flows to a load side is small according to the power circuit of this invention, as described above, and making the DC power supply for control can be made small.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] While changing alternating current into a direct current as mentioned above and making the main DC power supply, in order to make small the power loss for making the DC power supply for control, the above-mentioned DC power supply for control are made in the conventional power circuit which makes the DC power supply for control with an electrical potential difference lower than said main DC power supply by pressuring partially the half-wave rectification electrical potential difference outputted from the diode bridge which changes said alternating current into a direct current by the capacitor. However, there was a fault of it being added to the main DC-power-supply electrical potential difference to which the charge electrical potential difference of said partial pressure capacitor is outputted, and the output voltage concerning said load having become high, and having a bad influence on the component by the side of a load etc. by this circuit when the current which the load of the main DC power supply has, and flows to a load side is small. [light]
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MEANS

[Means for Solving the Problem] This invention pressures partially the half-wave-rectification electrical potential difference outputted from said diode bridge while carrying out smooth [of this] by the capacitor for smooth and obtaining the main DC power supply, after carrying out full wave rectification of the AC power supply in a diode bridge by two or more capacitors for partial pressures by which the series connection was carried out, and has a configuration possessing the capacitor charged on the half-wave-rectification electrical potential difference of reversed polarity with the half-wave-rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from said diode bridge in the power circuit which makes the DC power supply for control from this partial pressure electrical potential difference.

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OPERATION

[Function] Although the electrical potential difference charged by the series circuit of the capacitor for partial pressures for making the DC power supply for control is added to the capacitor for smooth of an output side in the power circuit of this invention when the load current of the main DC power supply becomes small Since said charge electrical potential difference of the capacitor charged on the half-wave rectification electrical potential difference of reversed polarity with the half-wave rectification electrical potential difference by which a partial pressure is carried out by said capacitor for partial pressures outputted from a diode bridge is added to the capacitor for smooth of said output side at coincidence, Said both charge electrical potential difference is canceled on said capacitor for smooth, and since the main DC-power-supply electrical potential difference outputted to said load side is pressured partially by the capacitor and makes control voltage while it can always maintain a predetermined electrical potential difference, it can make a power loss small.

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EXAMPLE

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[0010] After a partial pressure is carried out by capacitors C3 and C4 and the partial pressure electrical potential difference is rectified by diodes D1 and D2, smooth [of the half-wave rectification electrical potential difference generated between the input side edge child b of a diode bridge 1 and the output side terminal d] is further carried out by the capacitor C2, and it becomes the DC power supply for control. These DC power supply for control are supplied to the control circuit of the load described above from the power supply terminal 3 for control, for example etc. Here, the capacity of the capacitor C5 connected between the input terminal a of a diode bridge 1 and the output terminal c by the side of + and the above-mentioned capacitors C3 and C4 for partial pressures is set up as there is relation which is described below. By 1/C5=1 / C 3+1 / C4, after all, C5=C3C4/(C3+C4), i.e., the capacity of a capacitor C5, is set up so that it may become equal to the capacity when carrying out series connection of the capacitors C3 and C4. And the series circuit of capacitors C3 and C4 is connected between the input terminal b of a diode bridge 1, and the output terminal d by the side of -, since the capacitor C5 is connected between the input terminal a of a diode bridge 1, and the output terminal c by the side of +, the polarity of a part for a part for the direct current voltage charged by capacitors C3 and C4 and the direct current voltage charged by the capacitor C5 is opposite, and it becomes tales doses.

[0011] By the way, although a part for the direct current voltage by which this example was also charged by the capacitors C3 and C4 for partial pressures will be added to the electrical potential difference charged by the capacitor C1 if the current of an output terminal 2-1 and the main DC power supply supplied to a load side from 2-2 becomes small, at this time, the electrical potential difference charged by the capacitor C5 will also be added to the charge electrical potential difference of the capacitor C1 for smooth. However, on this electrical potential difference, since the polarity is opposite, the charge charged by the series circuit of capacitors C3 and C4 as described above, and the charge of each other on the capacitor C1 for smooth charged by the capacitor C5 are canceled after all, and the terminal voltage of a capacitor C1 is maintained by the predetermined main DC-power-supply electrical potential difference.

[0012] According to this example, since the DC power supply for control are pressuring partially and creating the half-wave rectification electrical potential difference outputted from a diode bridge 1 by capacitors C3 and C4, they can lessen the power loss for creating the DC power supply for control. Moreover, although the electrical potential difference charged by the series circuit of said capacitors C3 and C4 is added to the charge electrical potential difference of the capacitor C1 for smooth when the load current of the main DC power supply becomes

small Since said charge electrical potential difference of the capacitor C5 by which the electrical potential difference of reversed polarity was charged with the charge electrical potential difference of said capacitors C3 and C4 is added to the capacitor C1 for smooth at coincidence, Even if said load current becomes small, it is prevented that the terminal voltage of the capacitor C1 for smooth becomes high, and he is trying for there to be no bad influence to the component by the side of a load.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The circuit diagram having shown one example of the power circuit of this invention.
[Drawing 2] The circuit diagram having shown an example of the conventional power circuit.
[Drawing 3] The circuit diagram having shown other examples of the conventional power circuit.
[Description of Notations]
1 -- Diode bridge 2-1, 2-2 -- Output terminal
3 -- Power supply terminal for control 4 -- Source power supply
C1, C2, C3, C4, C5 -- Capacitor
D1, D2 -- Diode for rectification

[Translation done.]

(19)日本国特許庁（ＪＰ）　(12)**公開特許公報**（Ａ）　(11)特許出願公開番号

特開平6－284729

(43)公開日　平成６年(1994)10月７日

(51)Int.Cl.[5]	識別記号	庁内整理番号	Ｆ Ｉ	技術表示箇所
Ｈ０２Ｍ　7/06	Ａ	9180－5Ｈ		

審査請求　未請求　請求項の数２　ＯＬ　（全　４　頁）

(21)出願番号　特願平5－69805

(22)出願日　平成５年(1993)３月29日

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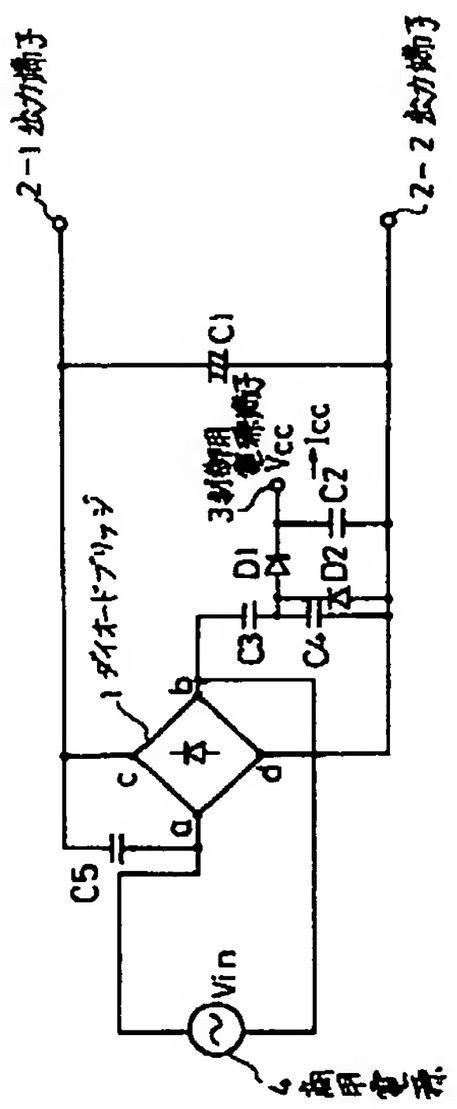
(54)【発明の名称】　電源回路

(57)【要約】
【目的】　本発明は、負荷側に流れる電流が小さくても、主直流電源の出力電圧が所定値よりも高くなることを防止し、且つ制御用直流電源を作るための電力ロスを小さくすることを目的としている。
【構成】　本発明において、ダイオードブリッジ１は商用電源４から入力される交流電流を全波整流して主直流電流に変換する。一方、ダイオードブリッジ１の半波整流電圧はコンデンサＣ３、Ｃ４により分圧された後、ダイオードＤ１、Ｄ２により整流され、更にコンデンサＣ２により平滑されて制御用直流電源になる。負荷の電流が小さくなると、コンデンサＣ３、Ｃ４にチャージされた電圧が平滑用コンデンサＣ１に加算されるが、この時コンデンサＣ５にチャージされた電圧も同コンデンサＣ１に加算される。しかし、コンデンサＣ３、Ｃ４のチャージ電圧とコンデンサＣ５のチャージ電圧は逆極性であるため、結局、コンデンサＣ１の端子電圧は所定電圧を維持する。



【特許請求の範囲】
【請求項１】　交流電源をダイオードブリッジで全波整流した後、これを平滑用コンデンサにて平滑して主直流電源を得ると共に、前記ダイオードブリッジから出力される半波整流電圧を直列接続された複数の分圧用コンデンサにより分圧し、この分圧電圧から制御用電源を作る電源回路において、前記ダイオードブリッジから出力される前記分圧用コンデンサにより分圧される半波整流電圧とは逆極性の半波整流電圧でチャージされるコンデンサを具備したことを特徴とする電源回路。
【請求項２】　前記ダイオードブリッジから出力される前記分圧用コンデンサにより分圧される半波整流電圧とは逆極性の半波整流電圧でチャージされるコンデンサの容量を、前記複数の分圧用コンデンサの直列接続容量に等しくしたことを特徴とする請求項１記載の電源回路。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】本発明は交流電源を直流電源に変換する電源回路に係り、特に主直流電源とは別に制御用の直流電源を得るための構成に関する。
【０００２】
【従来の技術】従来この種の電源回路は例えば図２に示すような構成を有している。商用電源４から入力される交流電流はダイオードブリッジ１により全波整流されてから平滑用コンデンサＣ１により平滑された後、出力端子２－１、２－２より図示されない負荷側（例えばインバータ等）に出力される。一方、制御用直流電源は抵抗Ｒ１と平滑用コンデンサＣ２との接続点に接続された制御用出力端子３から取り出され，図示されない制御用回路に供給される。即ち、この制御用直流電源はダイオードブリッジ１から出力される主直流電源電圧を抵抗Ｒ１により電圧降下させて得ている。ここで、入力電圧をＶｉｎとし、制御用端子３から出力される電流をＩｃｃとし、制御用電源端子３の出力電圧をＶｃｃとすると、上記のように抵抗Ｒ１の電圧降下によって制御用直流電源を作るため、有効消費電力が
【式】

$$\sqrt{2}\times Vin\times Icc$$

となって、制御用直流電源を作成するための電力ロスが大きくなるという欠点があった。
【０００３】そこで上記した欠点を回避するために、図３に示すような電源回路が開発されている。この回路では、ダイオードブリッジ１のマイナス側出力端子と交流電流入力端子との間に、コンデンサＣ３、Ｃ４から成る直列回路が接続されている。このコンデンサＣ３、Ｃ４の接続点から得られる分圧電圧はダイオードＤ１、Ｄ２により全波整流された後、平滑用コンデンサＣ２によって平滑されて、制御用直流電源になる。この回路ではダイオードブリッジ１から出力される半波整流電圧をコンデンサＣ３、Ｃ４で分圧して制御用直流電源を得ているため、有効消費電力は約Ｖｃｃ×Ｉｃｃとなり、図２に示した回路よりも電力ロス分をかなり小さくすることができる。しかし、出力端子２－１、２－２に接続される負荷側に流れる電流が小さい場合、コンデンサＣ３、Ｃ４にチャージされた直流分の電圧が平滑用コンデンサＣ１のチャージ電圧に加算されるため、端子２－１、２－２から出力される電圧が高くなってしまうという欠点があり、場合によっては負荷側の素子に悪影響を与えてしまうという不都合があった。
【０００４】
【発明が解決しようとする課題】上記のように交流電流を直流電流に変換して主直流電源を作ると共に、前記主直流電源よりも電圧が低い制御用の直流電源を作る従来の電源回路では、制御用直流電源を作るための電力ロスを小さくするため、前記交流電流を直流電流に変換するダイオードブリッジから出力される半波整流電圧をコンデンサで分圧することにより、上記制御用直流電源を作っている。しかし、この回路では主直流電源の負荷が軽く、負荷側に流れる電流が小さい場合、前記分圧コンデンサのチャージ電圧が出力される主直流電源電圧に加算されてしまい、前記負荷にかかる出力電圧が高くなって、負荷側の素子等に悪影響を与えるという欠点があった。
【０００５】そこで本発明は上記の欠点を除去し、負荷側に流れる電流が小さくても、主直流電源の出力電圧が所定値よりも高くなることがなく、且つ制御用直流電源を作るための電力ロスが小さい電源回路を提供することを目的としている。
【０００６】
【課題を解決するための手段】本発明は交流電源をダイオードブリッジで全波整流した後、これを平滑用コンデンサにて平滑して主直流電源を得ると共に、前記ダイオードブリッジから出力される半波整流電圧を直列接続された複数の分圧用コンデンサにより分圧し、この分圧電圧から制御用直流電源を作る電源回路において、前記ダイオードブリッジから出力される前記分圧用コンデンサにより分圧される半波整流電圧とは逆極性の半波整流電圧でチャージされるコンデンサを具備した構成を有する。
【０００７】
【作用】本発明の電源回路において、主直流電源の負荷電流が小さくなった時、制御用直流電源を作るための分圧用コンデンサの直列回路にチャージされた電圧が出力側の平滑用コンデンサに加算されるが、ダイオードブリッジから出力される前記分圧用コンデンサにより分圧される半波整流電圧とは逆極性の半波整流電圧でチャージされるコンデンサの前記チャージ電圧が前記出力側の平滑用コンデンサに同時に加算されるため、前記平滑用コンデンサ上で前記両チャージ電圧がキャンセルされ、前記負荷側に出力される主直流電源電圧は常に所定電圧を

維持することができると共に、コンデンサで分圧して制御電圧を作るため、電力ロスを小さくすることができる。

【０００８】

【実施例】以下、本発明の一実施例を図面を参照して説明する。図１は本発明の電源回路の一実施例を示した回路図である。１は交流電流を全波整流して直流電流に変換するダイオードブリッジ、２－１、２－２は主直流電源の出力端子、３は制御用直流電源が出力される制御用電源端子、４は交流電源を供給する商用電源、Ｃ１は主直流電源の平滑用コンデンサ、Ｃ２は制御用直流電源の平滑用コンデンサ、Ｃ３，Ｃ４は制御用直流電源を作るための分圧用コンデンサ、Ｃ５は分圧用コンデンサのチャージ電圧を平滑用コンデンサＣ１上でキャンセルするためのキャンセル用コンデンサ、Ｄ１，Ｄ２は制御用直流電源を得るための整流用ダイオードである。

【０００９】次に本実施例の動作について説明する。商用電源４から供給される交流電流はダイオードブリッジ１の入力側ａ、ｂに入力される。ダイオードブリッジ１は入力された交流電流を全波整流して直流電流に変換し、これを出力側ｃ、ｄから平滑コンデンサＣ１を通して出力端子２－１、２－２に出力する。このようにしてダイオードブリイジ１から出力された主直流電源は平滑コンデンサＣ１により平滑された後、出力端子２－１、２－２から図示されない負荷側に供給される。尚、ダイオードブリッジ１の出力側ｃが＋側で、出力側ｄが－側になっている。

【００１０】ダイオードブリッジ１の入力側端子ｂと出力側端子ｄとの間に発生される半波整流電圧はコンデンサＣ３、Ｃ４によって分圧され、その分圧電圧がダイオードＤ１、Ｄ２により整流された後、更にコンデンサＣ２により平滑されて制御用直流電源になる。この制御用直流電源は制御用電源端子３から例えば上記した負荷の制御回路等に供給される。ここで、ダイオードブリッジ１の入力端子ａと＋側の出力端子ｃとの間に接続されているコンデンサＣ５と、上記した分圧用のコンデンサＣ３、Ｃ４の容量は以下にのべるような関係があるように設定されている。１／Ｃ５＝１／Ｃ３＋１／Ｃ４で、結局Ｃ５＝Ｃ３Ｃ４／（Ｃ３＋Ｃ４）即ち、コンデンサＣ５の容量はコンデンサＣ３とＣ４を直列接続した時の容量と等しくなるように設定されている。しかも、コンデンサＣ３、Ｃ４の直列回路はダイオードブリッジ１の入力端子ｂと－側の出力端子ｄの間に接続され、コンデンサＣ５はダイオードブリッジ１の入力端子ａと＋側の出力端子ｃとの間に接続されているため、コンデンサＣ３、Ｃ４にチャージされる直流電圧分とコンデンサＣ５にチャージされる直流電圧分はその極性が反対で同量となる。

【００１１】ところで、出力端子２－１、２－２から負荷側に供給される主直流電源の電流が小さくなると、本例も分圧用コンデンサＣ３、Ｃ４にチャージされた直流電圧分がコンデンサＣ１にチャージされた電圧に加算されるが、この時、コンデンサＣ５にチャージされた電圧も平滑用コンデンサＣ１のチャージ電圧に加算されることになる。しかし、上記した如くコンデンサＣ３、Ｃ４の直列回路にチャージされた電荷とコンデンサＣ５にチャージされた電荷は同電圧で極性が反対のため、結局、平滑用コンデンサＣ１上で互いにキャンセルされ、コンデンサＣ１の端子電圧は所定の主直流電源電圧に維持される。

【００１２】本実施例によれば、制御用直流電源はダイオードブリッジ１から出力される半波整流電圧をコンデンサＣ３、Ｃ４で分圧して作成しているため、制御用直流電源を作成するための電力ロスを少なくすることができる。又、主直流電源の負荷電流が小さくなった時、前記コンデンサＣ３、Ｃ４の直列回路にチャージされた電圧が平滑用コンデンサＣ１のチャージ電圧に加算されるが、前記コンデンサＣ３、Ｃ４のチャージ電圧とは逆極性の電圧がチャージされたコンデンサＣ５の前記チャージ電圧が平滑用コンデンサＣ１に同時に加算されるため、前記負荷電流が小さくなっても平滑用コンデンサＣ１の端子電圧が高くなることが防止されて、負荷側の素子への悪影響がないようにしている。

【００１３】

【発明の効果】以上記述した如く本発明の電源回路によれば、負荷側に流れる電流が小さくても、主直流電源の出力電圧が所定値よりも高くなることを防止でき、且つ制御用直流電源を作るための電力ロスを小さくすることができる。

【図面の簡単な説明】

【図１】本発明の電源回路の一実施例を示した回路図。

【図２】従来の電源回路の一例を示した回路図。

【図３】従来の電源回路の他の例を示した回路図。

【符号の説明】

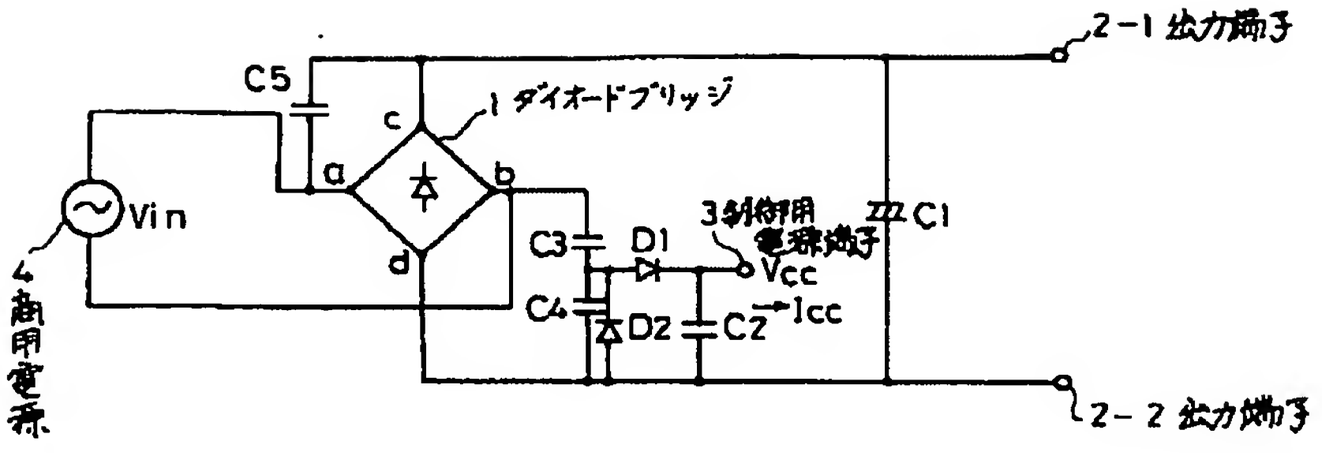
１…ダイオードブリッジ　　２－１、２－２…出力端子

３…制御用電源端子　　４…商用電源

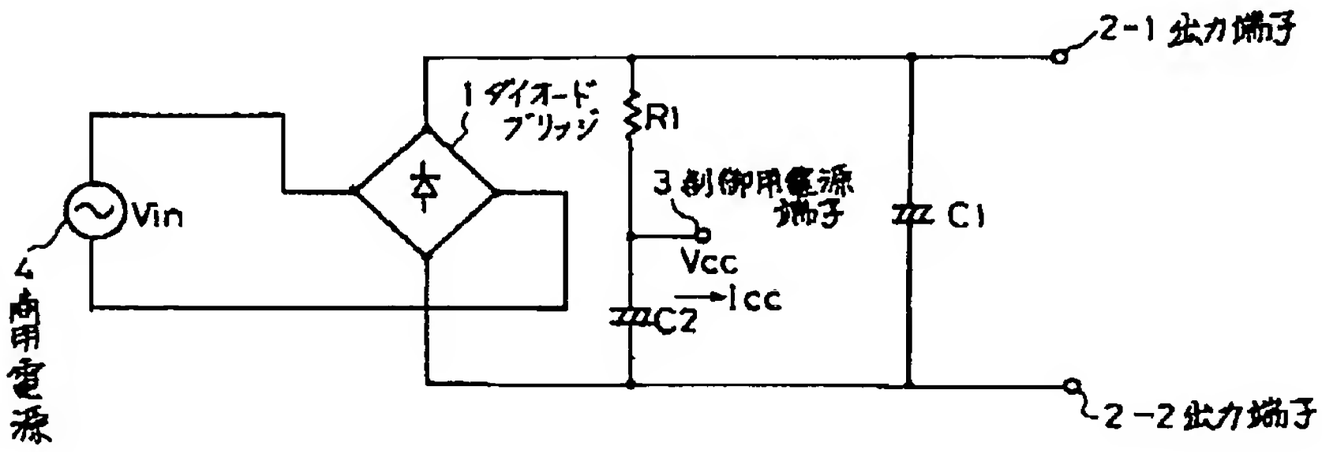
Ｃ１、Ｃ２、Ｃ３、Ｃ４、Ｃ５…コンデンサ

Ｄ１、Ｄ２…整流用ダイオード

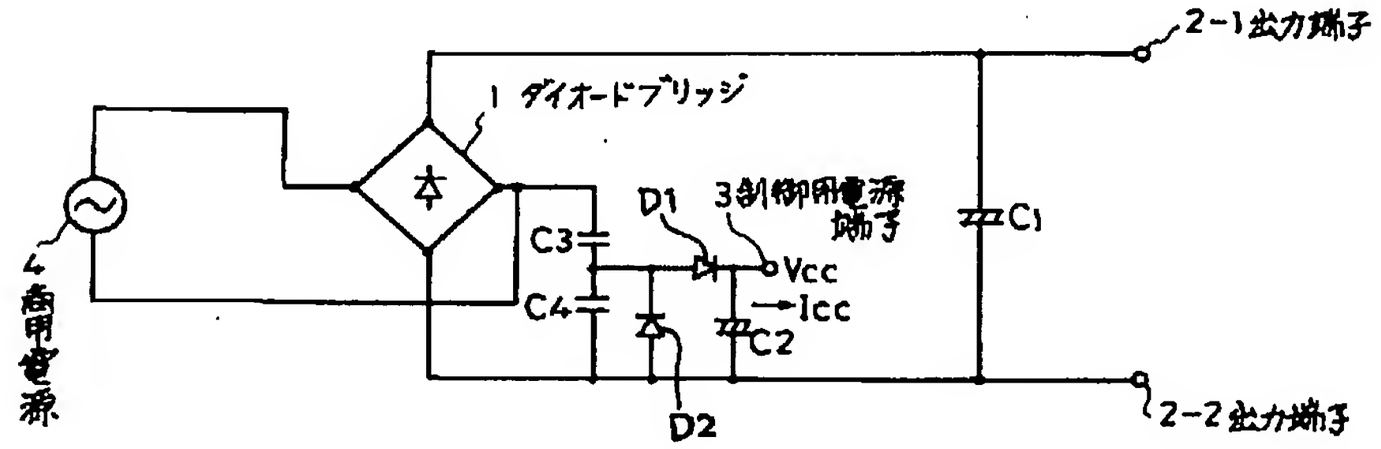
【図１】


2－1 出力端子
C5
1 ダイオードブリッジ
c
a
b
d
Vin
4 商用電源
C3
D1
3 制御用電源端子
Vcc
C1
C4
D2
C2
Icc
2－2 出力端子

【図２】


2－1 出力端子
1 ダイオードブリッジ
R1
3 制御用電源端子
Vin
Vcc
C1
4 商用電源
C2
Icc
2－2 出力端子

【図３】


2－1 出力端子
1 ダイオードブリッジ
D1
3 制御用電源端子
C1
C3
Vcc
C4
Icc
C2
D2
4 商用電源
2－2 出力端子